

# The State of Zero-Net Energy New Homes in 2014

## Part 1: Northern California

By Joseph W. Oldham

The Long Term Energy Efficiency Strategic Plan produced by the California Public Utilities Commission in 2008 contains a goal for achieving zero-net energy (ZNE) on all new homes in California by 2020. The idea behind this goal was that improvements in building materials and techniques, increasingly stringent Title 24 energy codes, and lower costs for on-site renewable energy would all come together by 2020 to make this goal a reality. However, the goal was set out prior to the Great Recession and the collapse of the housing market in 2009. Many people have wondered since the collapse if achieving the ZNE goal for residential new construction by 2020 is even feasible or if the marketplace is ready for the added cost of ZNE homes. The good news is that in spite of the Great Recession, significant progress has been made toward development of mass produced ZNE homes in various regions of California. This article is Part 1 of a two-part series and focuses on two examples of this effort in Northern California communities.

### DeYoung Homes, Clovis CA

The first example shows how a production home builder in one of the hottest climate zones in California has taken on the challenge of building and potentially offering ZNE homes for consumers (6) years ahead of the 2020 goal in the Strategic Plan. The DeYoung Homes ZNE model is the same floor plan as one of their popular mid-range models with 2,064 sq. ft. of floor space and single story layout.

This model home is currently on display at a new subdivision in Clovis, CA and DeYoung Properties is gauging interest before committing to build the unit. However, interest in the home has been very high, so it is possible these homes will be available to buyers soon.

The home is designed to produce as much energy as it consumes annually through the use of a very tight and well insulated shell design, duct work in conditioned space, Energy Star appliances, advanced electric heat pump water heater, an energy management system, and an on-site solar photovoltaic system. However, the home is built using current industry standard “stick construction” practices to make it fit into a typical subdivision development plan.



The home is the result of collaboration between Pacific Gas and Electric (PG&E) Company and DeYoung Properties with PG&E providing technical assistance for the project. The home is designed as a system so that the electricity produced on-site through the solar array is enough to offset all energy consumed annually by the home, including the natural gas consumption. The solar system is purposely sized to overproduce electricity, so that the surplus is equivalent to the amount of energy in the natural gas sent to the home. This also means the home is designed to achieve zero net carbon emissions. Ultimately, the excess electricity the ZNE home produces is sent back through the grid to be used by other buildings in the community. Some examples of the features used in the home are:

Advanced electric heat pump water heater

The latest Energy Star appliances



Duct work in conditioned space



The house is even prewired to allow for installation of a Level 2 electric vehicle charger in the garage. However,

High reflectivity cool roof tiles



the electricity use associated with charging an electric car is not calculated into the ZNE design of the home. For more information about this home, go to this link: <http://www.deyoungproperties.com/why-choose-us/energysmart/net-zero>

### **Honda ZNE Demonstration Home, Davis, CA**

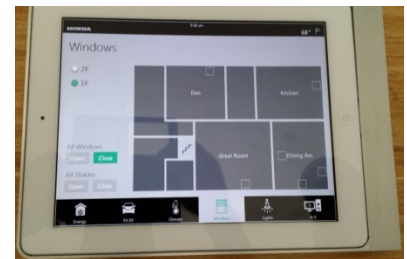
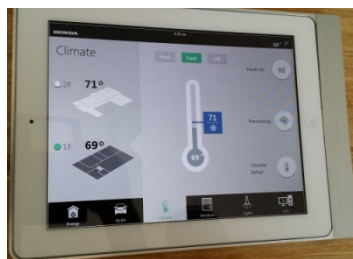
So for those folks that thought Honda Motor Company only built cars and motorcycles, this state-of-the-art ZNE demonstration home in Davis, CA comes as quite a shock. I was fortunate enough to tour the home on the day of its grand opening where I was able to see how every conceivable new building technique and advanced energy technology was designed into this structure right from the start.

Another collaborative effort with PG&E, the Honda home is located in the West Village area on the UC Davis campus; a fitting location since the West Village is designed to be the largest ZNE housing development in the nation. From the beginning of the tour we were told this nearly 2,000 sq. ft. home

was not designed to be mass produced. This is in sharp contrast to the DeYoung Properties home in Clovis about 160 miles to the south. The Honda house is an open loft interior, two story design that uses thermal mass, solar photovoltaic, energy storage, and underground cisterns for energy recovery from the advanced ground source



heat pump water heating system. The house is controlled by a very sophisticated energy management system which not only tells you what the temperature is on each floor at any given moment, but also lets you know when someone leaves a window open and opens and closes the blinds automatically! Some of the Energy Management System (EMS) displays are shown here:



Even the landscaping is designed to have low resource intensity through incorporation of drought tolerant plants that don't require regular irrigation during the summer months. There are also rain garden swales to capture run-off and channel it to help water the landscape.

But the most impressive detail is in the garage. (I suppose I should have expected that since Honda did build the house.) The electric vehicle charging equipment and advanced energy storage system sit nicely positioned next to a Honda Fit Electric Car with the energy storage system visible through sliding glass doors equipped with polished steel handles.

So how much would it cost to have Honda build a home like this for you, if it were mass-produced? Don't ask! This is a "concept house" and, just like a "concept car", they aren't designed for mass consumption. This house is a "test bed" for technology and will be evaluated over the coming years to see how it performs. We were told that various faculty and their families from UC Davis will be chosen to live in the home for periods of time to test how the systems perform and verify if the house truly is ZNE in performance. Not sure if the car is part of the deal!

It will be interesting to see in the coming years how much of the technology being tested in the Honda ZNE home becomes mainstream in housing of the future. Maybe they will even add a robot to take out the trash and mow the lawn; I know my children would love for me to buy one of those!

For more information on the Honda Smart ZNE Home, go here:

<http://www.hondasmarthome.com/>

